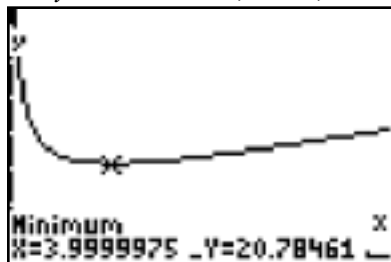


Substitute the expression for x .

$$\begin{aligned}
 A &= x(h+2) \\
 &= \frac{2h+4}{\sqrt{h^2-4}}(h+2) \\
 &= \frac{2(h+2)}{\sqrt{h^2-4}}(h+2) \\
 &= \frac{2(h+2)^2}{\sqrt{h^2-4}}
 \end{aligned}$$

At this point, students should consider the domain of this area function.

For y to be defined, $h \geq 2$, and for x and A to be defined, $h > 2$.



```

WINDOW
Xmin=2
Xmax=9.4
Xscl=1
Ymin=0
Ymax=55
Yscl=1
Xres=1

```

The area is at a minimum when $h = 4$.

Then $x = \frac{6}{\sqrt{3}}$ and $y = 2\sqrt{3}$.

Therefore, the triangle is equilateral and each side is $\frac{12}{\sqrt{3}}$, or about 6.93, units long.

CHAPTER 4: RUBRIC FOR CHALLENGE 2

Assessment Category	Scores and Criteria			
	Passable level of achievement – below provincial standard LEVEL 1	Moderate level of achievement – below, but approaching provincial standard LEVEL 2	High level of achievement – at provincial standard LEVEL 3	Very high to outstanding level of achievement – above provincial standard LEVEL 4
Knowledge and Understanding				
Demonstration of understanding of a concept	Answer attempted but work shows limited understanding of the incircle, tangency, area as a function, and the domain of this function.	Work shows some understanding of the incircle, tangency, area as a function, and the domain of this function.	Solution shows good understanding of the incircle, tangency, area as a function, and the domain of this function.	Detailed solution shows thorough understanding of the concepts.
Performance of an algorithm by hand, mentally, or using technology	Student obtains an area function using an incorrect procedure, or makes many errors in Pythagorean computations. Student uses technology to find dimensions for minimum area with limited success.	Student attempts to use Pythagorean theorem to relate dimensions and generate an area function, but work may contain inaccuracies. Student uses technology to find dimensions for minimum area with some success.	Student uses Pythagorean theorem to relate dimensions and area function generated, with most computations generally correct. Dimensions for minimum area successfully found using technology.	Area function is generated efficiently, accurately, and work is verified or supported. Dimensions for minimum area successfully found using a variety of technologies.

(continued on next page)

CHAPTER 4: RUBRIC FOR CHALLENGE 2 (continued)

Assessment Category	Scores and Criteria			
	Passable level of achievement – below provincial standard LEVEL 1	Moderate level of achievement – below, but approaching provincial standard LEVEL 2	High level of achievement – at provincial standard LEVEL 3	Very high to outstanding level of achievement – above provincial standard LEVEL 4
Thinking, Inquiry, Problem Solving				
Formulation of the problem	Student does not use information correctly to create diagram and/or incorrectly identifies variables.	Student uses information correctly to create diagram but incorrectly identifies variables.	Student creates an accurate diagram from the given information and identifies most variables correctly.	Student creates an accurate diagram from the given information and clearly identifies all variables correctly.
Creation of a model (algebraic, graphical, geometric, physical, technological) to solve a problem	Student uses a model or plan that addresses few aspects of the problem.	Student uses a model or plan that addresses some aspects of the problem.	Student uses an appropriate plan.	Student uses an appropriate plan that integrates all aspects of the problem.
Selection and sequencing of a variety of tools and strategies (congruent triangles, Pythagorean theorem, graphing technology) to solve problem	Student selects a few appropriate tools but omits key strategies and does not sequence correctly.	Student selects some appropriate tools with minor omissions or incorrect sequencing.	Student selects appropriate tools and incorporates these in the execution of the plan to solve the problem.	Student selects appropriate tools and correctly sequences to solve problem and verifies solution with further strategies.
Making conclusions and inferences	The conclusions are somewhat connected with the student's solution but are unsupported.	The conclusions are consistent with the student's solution but are not fully supported.	The conclusions are supported by evidence and integrate aspects of the problem.	The conclusions are supported, integrate all aspects of the problem, and are convincing.
Communication				
Correct use of mathematical symbols, labels, and conventions (units, formulas, labels on axes)	Few mathematical conventions are used correctly.	Some mathematical conventions are used correctly.	Most mathematical conventions are used correctly.	Consistently uses mathematical conventions correctly.
Appropriate use of mathematical vocabulary	Rarely uses mathematical words correctly.	Occasionally uses mathematical words correctly.	Often uses mathematical words correctly.	Consistently uses mathematical words correctly.
Degree of clarity in explanations and justifications	Communication is limited but parts are understandable.	Communication is generally understandable and complete.	Communication is clear and complete.	Communication is consistently clear so that explanations and justifications are thoroughly understandable.
Application				
Use of a selected tool or strategy to solve a complex problem.	Student uses the selected tool or strategy somewhat inaccurately.	Student uses the selected tool or strategy with minor errors.	Student uses the selected tool or strategy correctly.	Student uses the selected tool or strategy correctly and provides verification or support.